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| EXAMINER |
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MCDONALD, RODNEY GLENN

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| ART UNIT | PAPER NUMBER |
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1753

DATE MAILED: 02/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/633,130

Applicant(s)

FISCHIONE ET AL.

Examiner

Rodney G. McDonald

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _____ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) See Continuation Sheet is/are pending in the application.
- 4a) Of the above claim(s) 152-157 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-61,64-96,98-105,107-129,131,138-141 and 158-164 is/are rejected.
- 7) ☒ Claim(s) 62,63,97,106,130,132-137 and 142-151 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Continuation of Disposition of Claims: Claims pending in the application are 1-164

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Claims 1-5, 8-15, 32-36, 39, 55, 58-61, 64, 68-73, 76, 82, 88-90, 93-96, 102, 104, 105, 107-109, 118, 121-124 and 138-141 are rejected under 35 U.S.C. 102(e) as being anticipated by Nomura et al. (U.S. Pat. 6,641,703).

Regarding claims 1, 55, 90, Nomura et al. teach an apparatus for preparing a specimen. The apparatus comprises a RF plasma sputtering mechanism for clean etching the specimen. (Column 7 lines 35-37) The apparatus comprises a means for coating the specimen with conductive material. (Column 6 lines 50-61) The plasma cleaning and coating occurs under continuous vacuum conditions since all the chambers include vacuum pumps. (Column 6 lines 29-39)

Regarding claim 2, Nomura et al. teach a means for removing in the form of an ion beam etching device. (Column 7 line 35) The processing occurs under continuous vacuum conditions since all the chambers include vacuum pumps. (Column 6 lines 29-39)

Regarding claim 3, Nomura et al. teach the means for removing being an ion beam. (Column 7 line 35)

Regarding claim 4, Nomura et al. teach that an ion beam mechanism which is inherently an ion source. (Column 7 line 35)

Art Unit: 1753

Regarding claim 5, Nomura et al. teach an ion beam. The ion beam would inherently utilize a source of process gas. (Column 7 line 35)

Regarding claims 8, 11, 105, Nomura et al. teach first and second chambers being connected through a vacuum valve 20 where the inside of the first chamber and the second chamber may be exposed to an inside of the first chamber under continuous vacuum conditions when the vacuum valve 20 is opened. (See Fig. 1)

Regarding claims 9, 12, Nomura et al. teach the plasma generator (i.e. RF generator for cleaning) is in the first chamber 18 and the means for coating is in the second chamber 17A, 17B, 17C. (See Fig. 1)

Regarding claims 10, 13, Nomura et al. teach the transfer rod 13 transfers the specimen between the chamber under vacuum conditions. (See Figure 1)

Regarding claim 14, 70, Nomura et al. teach the entire apparatus can be considered a vacuum chamber and the vacuum chamber supports the plasma generator for cleaning and the means for coating with the operations being performed in the apparatus. (See Fig. 1)

Regarding claims 15, 71, 72, 88, 89, 108, Nomura et al. teach the entire apparatus can be considered a vacuum chamber for supporting the means for coating, means for removing and means for cleaning the processings being performed in the vacuum chamber. (See Fig. 1)

Regarding claims 32, 39, 109, Nomura et al. teach an apparatus having a plasma generator (i.e. RF generator) for plasma cleaning and a means for removing material (i.e. ion beam etching mechanism). The plasma cleaning and removing can be carried

Art Unit: 1753

out under continuous vacuum conditions. (Column 7 lines 35-37; Column 6 lines 35-39; Fig. 1)

Regarding claim 33, Nomura et al. teach means for etching using an ion beam. (Column 7 lines 35-37)

Regarding claim 34, Nomura et al. teach means for etching utilizing an ion source. (Column 7 lines 35-37)

Regarding claim 35, Nomura et al. teach utilizing an ion mechanism for etching . The ion mechanism inherently requires a gas source. (Column 7 lines 35-37)

Regarding claim 36, Nomura et al. teach first and second vacuum chambers where the substrate is maintained under vacuum. (See Fig. 1)

Regarding claims 58, 93, 121 Nomura et al.'s RF plasma cleaning process is inherently a capacitive discharge process whereby the substrate is plasma etched. (Column 7 lines 35-37; Column 8 line 1)

Regarding claims 59, 94, 122, Nomura et al. teach the first electrode would be a RF electrode and a workpiece holder would be the second electrode. (Column 7 lines 35-37; Column 8 line 1)

Regarding claims 60, 95, 123, Nomura et al. teach the electrode would be parallel to each other. (Column 7 lines 35-37; Column 8 line 1)

Regarding claim 61, Nomura et al. teach the workpiece holder is a first electrode. (Column 7 lines 35-37)

Art Unit: 1753

Regarding claims 64, 96, 121, 124 Nomura et al. teach the RF source is the alternating source for creating the plasma. (Column 7 lines 35-37) The source power is inherently set by a user.

Regarding claim 68, Nomura et al. teach ion beam etching. (Column 7 lines 35-37)

Regarding claims 69, 73, Nomura et al. teach an apparatus with an ion beam etching source for etching the ion beam would be inherently directed. (Column 7 lines 35-37)

Regarding claims 76, 82, 102, 104, Nomura et al. teach a plasma generator for plasma cleaning. (Column 7 lines 35-37)

Regarding claim 107, Nomura et al. teach the vacuum valve would have a baffle that opens and closes for admitting the substrate. (See Fig. 1)

Regarding claim 118, Nomura et al. teach the load/unload chambers. (Column 6 lines 22-25)

Regarding claims 138-141, Nomura et al. teach a sample stage in the form of a robot arm for moving the substrate to plurality of positions. It's inherently automatic because its automated robot arm.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 16, 21-25, 56, 57, 65, 77, 83, 91, 92, 110, 116, 117 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (U.S. Pat. 6,641,703) in view of Ameen et al. (U.S. Pat. 6,143,128).

Nomura et al. is discussed above and all is as applies above. (See Nomura et al. discussed above)

The difference between Nomura et al. and the present claims is that an RF coil is used for cleaning (Claim 16, 65, 77, 83) and the use of turbomolecular pumps (Claims 21-25, 56, 57, 91, 92, 110)

Regarding claims 16, 65, 77, Ameen et al. teach that for cleaning a RF coil for a chamber can be utilized. (Column 9 lines 48-68; Column 10 lines 1-7)

The motivation for utilizing an RF coil for cleaning is that it allows for cleaning the substrate. (Column 9 lines 48-68; Column 10 lines 1-7)

Regarding claims 21-25, 56, 57, Ameen et al. teach that a coating chamber and a cleaning chamber may have a turbomolecular pump. (Column 6 lines 39-43; Column 9 lines 49-50)

The motivation for providing a turbomolecular pump is that it allows for creating a vacuum. (Column 9 lines 49-53)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nomura et al. by utilizing an RF coil and turbomolecular pumps as taught by Ameen et al. because it allows cleaning of the substrate and producing vacuum.

Claims 6, 17-20, 66, 78-81, 84-87, 98, 111-115, 119, 120, 125-128 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. in view of Ameen et al. as applied to claims above, and further in view of Chang et al. (U.S. Pat. 6,434,814).

The differences not yet discussed is the gases used for cleaning and multiple gas inlets and magnetron sputtering

Chang et al. teach that Ar and oxygen can be utilized for clean etching. Utilizing two gases would require two inlets for the gases. (Column 8 lines 57-65)

Chang et al. suggests magnetron coating for sputtering. (Column 6 lines 57-62)

Art Unit: 1753

The motivation for utilizing Ar and oxygen is that it allows for cleaning. (Column 8 lines 57-65)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized oxygen and argon as taught by Chang et al. because it allows cleaning of the substrate.

Claims 26, 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (U.S. Pat. 6,641,703) in view of Mitro et al. (U.S. Pat. 5,922,179).

Nomura et al. is discussed above and all is as applied above. (See Nomura et al. discussed above)

The difference not yet discussed is the rotation and tilting of the specimen holder (Claims 26, 29) and means for cooling (Claim 27).

Regarding claims 26, 29, Mitro et al. teach a specimen holder that rotates and rocks. (Column 4 lines 20-27)

Regarding claim 27, Mitro et al. teach a specimen holder that is cooled. (Column 3 lines 15-22)

The motivation for cooling, rotating and tilting the substrate is that it allows for uniform coating and etching of the film. (Column 4 lines 20-33)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nomura et al. by cooling, rotating and tilting of the substrate holder as taught by Mitro et al. because it allows for uniform coating and etching of the film.

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. in view of Mitro et al. as applied to claim 26 above, and further in view of Kamei et al. (U.S. Pat. 5,783,055).

The difference not yet discussed is the substrate moving along the axis of rotation.

Kamei et al. teach a substrate holder which can change the distance between the substrate and the target. (Column 6 lines 31-35)

The motivation for changing the distance between the substrate and the target is that it allows for optimizing the distance between the target and the substrate. (Column 2 lines 48-57)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have changed the distance between the substrate and the target.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (U.S. Pat. 6,641,703) in view of Kobayashi et al. (U.S. Pat. 5,340,460).

The difference not yet discussed is the use of a cold trap.

Kobayshi et al. teach a cold trap in the chamber. (Column 4 lines 32-39; Fig. 3)

The motivation for providing a cold trap in the chamber is that it allows for capturing residual gases. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nomura et al. by utilizing a cold trap as taught by Kobayashi et al. because it traps residual gases.

Art Unit: 1753

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (U.S. Pat. 6,641,703) in view of Holland (U.S. Pat. 4,311,725).

The difference not yet discussed is the crystal oscillator.

Holland teach a crystal oscillator for measuring the amount of total material deposited and ending deposition. (Column 8 lines 11-40)

The motivation for utilizing a crystal oscillator is that it allows for measuring the amount of film deposited. (Column 8 lines 11-40)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nomura et al. by utilizing a crystal oscillator as taught by Holland because it allows for measuring the thickness.

Claims 7, 37, 38, 67, 74, 99, 100, 101, 103, 129, 131 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (U.S. Pat. 6,641,703) in view of Kamei et al. (U.S. Pat. 5,783,055).

Nomura et al. is discussed above and all is applies above.

The differences not yet discussed is the plasma cleaning being carried out in the first chamber and the removing being carried out in the second chamber (Claim 37), the transfer rod is not discussed (Claim 38), ion beam sputtering target is not discussed. (Claims 7, 67, 74, 99, 100, 101, 103, 129, 131)

Regarding Claim 37, Kamei et al. teach providing a pretreatment chamber (Column 2 lines 1-6) and providing a coating chamber with an assist ion surface which can be for milling the substrate. (Column 4 lines 57-64)

Art Unit: 1753

Regarding claim 38, Kamei et al. teach providing a rod for moving the substrate.
(Column 4 lines 12-13)

Regarding claims 7, 67, 74, 99, 100, 101, 103, 129, 131, Kamei et al. teach providing a deposition chamber with an ion beam and sputtering targets. The ion beam can mill the substrate which is considered to be a plasma cleaning or etching process.
(Column 4 lines 49-67)

The motivation for utilizing first and second chambers for pretreating and for etching because it allows for improving productivity. (Column 2 lines 32-39)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nomura et al. by utilizing a first and second chamber for carrying out the processes and providing a rod to move the substrate as taught by Kamei et al. because it allows for improving productivity.

Claims 40 and 45-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (U.S. Pat. 6,641,703) in view of Ameen et al. (U.S. Pat. 6,143,128).

The difference between Nomura et al. and the present claims is that an RF coil is used for cleaning (Claim 40) and the use of turbomolecular pumps (Claims 45-49)

Regarding claim 40, Ameen et al. teach that for cleaning a RF coil for a chamber can be utilized. (Column 9 lines 48-68; Column 10 lines 1-7)

The motivation for utilizing an RF coil for cleaning is that it allows for cleaning the substrate. (Column 9 lines 48-68; Column 10 lines 1-7)

Art Unit: 1753

Regarding claims 45-49, Ameen et al. teach that a coating chamber and a cleaning chamber may have a turbomolecular pump. (Column 6 lines 39-43; Column 9 lines 49-50)

The motivation for providing a turbomolecular pump is that it allows for creating a vacuum. (Column 9 lines 49-53)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nomura et al. by utilizing an RF coil and turbomolecular pumps as taught by Ameen et al. because it allows cleaning of the substrate and producing vacuum.

Claims 41-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. in view of Ameen et al. as applied to claim 40 above, and further in view of Chang et al. (U.S. Pat. 6,434,814).

The differences not yet discussed is the gases used for cleaning.

Chang et al. teach that Ar and oxygen can be utilized for cleaning. (Column 8 lines 57-65)

The motivation for utilizing Ar and oxygen is that it allows for cleaning. (Column 8 lines 57-65)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized oxygen and argon as taught by Chang et al. because it allows cleaning of the substrate.

Claims 50, 51 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (U.S. Pat. 6,641,703) in view of Mitro et al. (U.S. Pat. 5,922,179).

Art Unit: 1753

Nomura et al. is discussed above and all is as applied above. (See Nomura et al. discussed above)

The difference not yet discussed is the rotation and tilting of the specimen holder (Claim 50, 53) and means for cooling (Claim 51).

Regarding claims 50, 53, Mitro et al. teach a specimen holder that rotates and rocks. (Column 4 lines 20-27)

Regarding claim 51, Mitro et al. teach a specimen holder that is cooled. (Column 3 lines 15-22)

The motivation for cooling, rotating and tilting the substrate is that it allows for uniform coating and etching of the film. (Column 4 lines 20-33)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nomura et al. by cooling, rotating and tilting of the substrate holder as taught by Mitro et al. because it allows for uniform coating and etching of the film.

Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. in view of Mitro et al. as applied to claim 50 above, and further in view of Kamei et al. (U.S. Pat. 5,783,055).

The difference not yet discussed is the substrate moving along the axis of rotation.

Kamei et al. teach a substrate holder which can change the distance between the substrate and the target. (Column 6 lines 31-35)

Art Unit: 1753

The motivation for changing the distance between the substrate and the target is that it allows for optimizing the distance between the target and the substrate. (Column 2 lines 48-57)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have changed the distance between the substrate and the target.

Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (U.S. Pat. 6,641,703) in view of Kobayashi et al. (U.S. Pat. 5,340,460).

The difference not yet discussed is the use of a cold trap.

Kobayashi et al. teach a cold trap in the chamber. (Column 4 lines 32-39; Fig. 3)

The motivation for providing a cold trap in the chamber is that it allows for capturing residual gases. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nomura et al. by utilizing a cold trap as taught by Kobayashi et al. because it traps residual gases.

Claim 75 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. in view of Kamei et al. as applied to claim 74 above, and further in view of Mitro et al. (U.S. Pat. 5,922,179).

The difference not yet discussed is the rotation and tilting of the specimen holder (Claims 75)and means for cooling (Claim 51).

Regarding claim 75, Mitro et al. teach a specimen holder that rotates and rocks. (Column 4 lines 20-27)

Art Unit: 1753

The motivation for cooling, rotating and tilting the substrate is that it allows for uniform coating and etching of the film. (Column 4 lines 20-33)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nomura et al. by cooling, rotating and tilting of the substrate holder as taught by Mitro et al. because it allows for uniform coating and etching of the film.

Claims 158-164 rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (U.S. Pat. 6,641,703) in view of Moslehi (U.S. Pat. 6,051,113) and Baldwin et al. (U.S. Pat. 6,419,802).

Nomura et al. is discussed above and all is as applies above. (See Nomura et al. discussed above)

The differences not yet discussed is the use of a position sensor for automatically controlling the location of the substrate and the use of laser to detect position.

Moslehi et al. teach utilizing a position sensor for locating a substrate holder under a processing position and automatically moving the substrate. (See Moslehi Column 4 lines 17-44)

Baldwin et al. teach utilizing a beam (i.e. laser) for sensing the position of a substrate. (Column 3 lines 1-27)

The motivation for utilizing a sensor is that it determines the position of the substrate. (Column 4 lines 17-44)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Nomura et al. by utilizing a position

sensor and laser as taught by Moslehi and Baldwin et al. because it allows for determining the position of the substrate.

Allowable Subject Matter

Claims 62, 63, 97, 106, 130, 132-137, 142-151 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments filed 12-9-05 have been fully considered but they are not persuasive.

Applicant has argued that the claims require separate chambers for the processes. However the claims require only that the apparatus perform the processing under continuous vacuum conditions. Clearly Nomura et al. teach carrying out the processing under continuous vacuum conditions because the substrate never leaves the apparatus.


The Examiner has applied new references to meet the claim limitations. This action will be made NON-Final.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

Art Unit: 1753

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
February 17, 2006